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| 10/813,629 | 03/31/2004 | Ryosuke Usui | 65933-084 | 3812 |

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| EXAMINER |
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NGUYEN, DILINH P

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| ART UNIT | PAPER NUMBER |
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2814

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06/15/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/813,629

Applicant(s)

USUI ET AL.

Examiner

DiLinh Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7, 11, 15, 16 and 23-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7, 11, 15, 16 and 23-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 03/2007, 2/2007, 11/2006.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claim 25 is objected to because of the following informalities:

Line 2, claim 25, replace "bass" with -- base --.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-5, 7, 11 and 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaneshiro et al. (JP 10-284648) (previously applied) in view of Bergmann et al. (U.S. Pub. 2006/0017069) (previously applied) and further in view of Nojima et al. (U.S. Pat. 6399277) (newly cited).

- Regarding claims 1 and 15, Kaneshiro et al. disclose a semiconductor module comprising:

- an insulating base material 5A provided with a conductor circuit;

- a semiconductor element 7 formed on the insulating base material; and

- an insulator 12 disposed in contact with the insulating base material and the semiconductor element;

wherein the surface of the insulating base material 5A provided with minute projections (the surface of the solder resist film is roughened) (paragraph 0012) is in contact with the insulator 12 (fig. 2 and abstract).

Kaneshiro et al. do not explicitly disclose that the projections have 1nm to 20 nm in average diameter and the insulating base material (the solder resist film 5A) includes at least one of photopolymerizable thermosetting resin containing a polyfunctional oxetane compound or an epoxy compound, epoxy resin, BT resin, and liquid crystal polymer.

However, Bergmann et al. disclose a semiconductor device comprising a plurality of nanoparticles have 10 to 50 nanometers in average diameter (paragraph 0037) in order to use for low-viscosity adhesive base compositions (paragraph 0037).

Nojima et al. disclose a semiconductor device comprising: an insulating base material includes at least one of photopolymerizable thermosetting resin containing an epoxy compound (column 37, lines 57-67) in order to provide excellent adhesion property, water-soluble flux resistance, soldering resistance and electric characteristics for protecting the circuit of a printed wiring board (column 1, lines 14-22 and column 36, lines 12-23).

Therefore, it would have been obvious to one having ordinary in the art at the time the invention was made to modify the device of Kaneshiro et al. by having a plurality of nanoparticles having 10 to 50 nanometers in average diameter and the insulating base material includes at least one of photopolymerizable thermosetting resin containing a polyfunctional oxetane compound or an epoxy compound, epoxy resin, BT

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resin, and liquid crystal polymer because as taught by Bergmann et al. and Nojima et al. in order to use for low-viscosity adhesive base compositions and to provide excellent adhesion property, water-soluble flux resistance, soldering resistance and electric characteristics for protecting the circuit of a printed wiring board.

- It is noted that the process limitation: "...plasma processing..." does not carry weight in a claim drawn to structure.

Initially, and with respect to claims 1 and 15, note that a "product by process" claim is directed to the product per se, no matter how actually made. See In re Thorpe et al., 227 USPQ 964 (CAFC, 1985) and the related case law cited therein which makes it clear that it is the final product *per se* which must be determined in a "product by process" claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. As stated in Thorpe,

Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself, *In re Brown*, 459 F.2d 531, 535, 173 USPQ 685, 688 (CCPA 1972); *In re Pilkington*, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969); *Buono v. Yankee Maid Dress Corp.*, 77 F. 2d 274, 279. 26 USPQ 57, 61 (2d. Cir, 1935).

- Regarding claim 2, Kaneshiro et al. disclose that the insulator 12 is a sealing resin for sealing the semiconductor element therein (fig. 2, abstract, line 19).

- Regarding claim 3, Kaneshiro et al. disclose that the insulator is an adhesive provided between the semiconductor element and the insulating base material (fig. 2).
- Regarding claims 4-5 and 16, Kaneshiro et al. disclose that the plasma treatment is performed on the insulating layer to form the unevenness on the surface of the insulating layer or to roughen the surface. This shows that, by ensuring that arithmetic mean roughness of the surface of the insulating base material 5A is $\leq 0.2 \mu\text{m}$ or desirably, $\leq 0.4 \mu\text{m}$, adhesion between the insulating base material 5A and the sealed body 12 is enhanced (paragraphs 0033 and 0035). Therefore, a surface of the insulating base material 5A of Kaneshiro et al. would have a plurality of shaped recesses that is in contact with the insulator 12 (fig. 2).
Kaneshiro et al. disclose the claimed invention except for crater-shaped recesses. It would have been obvious to one having ordinary skill in the art at the time the invention was made to form a plurality of crater-shaped recesses. A change in shape is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955).
- Regarding claim 7, Bergmann et al. do not explicitly disclose the projections formed in a number density of not less than $0.5 \times 10^3 \mu\text{m}^{-2}$. However, the density range would have been obvious to an ordinary artisan practicing the invention because, absent evidence of disclosure of criticality for the range giving unexpected results, it is not inventive to discover optimal or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA

1955). Furthermore, the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising therefrom.

Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. See *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed, Cir. 1990).

- Regarding claim 11, Kaneshiro et al. disclose that the semiconductor element 7 is a bare chip and the insulator 12 is constituted essentially of a sealing resin for sealing the bare chip 7 therein (fig. 2).
- Regarding claims 23 and 24, Nojima et al. disclose that the epoxy resin is thermosetting resin (column 1, lines 14-22 and column 36, lines 12-23).

3. Claims 25-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaneshiro et al. (JP 10-284648) (newly cited for new claims 25-28) in view of Nojima et al. (U.S. Pat. 6399277) (newly cited for new claims 25-28).

- Regarding claims 25-26, Kaneshiro et al. disclose a semiconductor module comprising:
 - an insulating base material 5A provided with a conductor circuit;
 - a semiconductor element 7 formed on the insulating base material; and
 - an insulator 12 disposed in contact with the insulating base material and the semiconductor element;

wherein the surface of the insulating base material 5A provided with minute projections (the surface of the solder resist film is roughened) (paragraph 0012) is in contact with the insulator 12 (fig. 2 and abstract).

Kaneshiro et al. do not explicitly disclose that the insulating base material (the solder resist film 5A) includes at least one of photopolymerizable thermosetting resin containing a polyfunctional oxetane compound or an epoxy compound, epoxy resin, BT resin, and liquid crystal polymer.

However, Nojima et al. disclose a semiconductor device comprising: an insulating base material includes at least one of photopolymerizable thermosetting resin containing an epoxy compound (column 37, lines 57-67). Therefore, it would have been obvious to one having ordinary in the art at the time the invention was made to modify the device of Kaneshiro et al. by having the insulating base material includes at least one of photopolymerizable thermosetting resin containing a polyfunctional oxetane compound or an epoxy compound, epoxy resin, BT resin, and liquid crystal polymer because as taught by Nojima et al. in order to use for low-viscosity adhesive base compositions and to provide excellent adhesion property, water-soluble flux resistance, soldering resistance and electric characteristics for protecting the circuit of a printed wiring board.

- It is noted that the process limitation: "...plasma processing..." does not carry weight in a claim drawn to structure.

Initially, and with respect to claims 25-26, note that a "product by

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process" claim is directed to the product *per se*, no matter how actually made. See In re Thorpe et al., 227 USPQ 964 (CAFC, 1985) and the related case law cited therein which makes it clear that it is the final product *per se* which must be determined in a "product by process" claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. As stated in Thorpe,

Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself, *In re Brown*, 459 F.2d 531, 535, 173 USPQ 685, 688 (CCPA 1972); *In re Pilkington*, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969); *Buono v. Yankee Maid Dress Corp.*, 77 F. 2d 274, 279. 26 USPQ 57, 61 (2d. Cir, 1935).

- Regarding claims 27-28, Nojima et al. disclose that the epoxy resin is thermosetting resin (column 1, lines 14-22 and column 36, lines 12-23).

Response to Arguments

Applicant's arguments with respect to claims 1-5, 7, 11, 15-16 and 23-28 have been considered but are moot in view of the new ground(s) of rejection. See the new grounds of rejection above.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

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§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

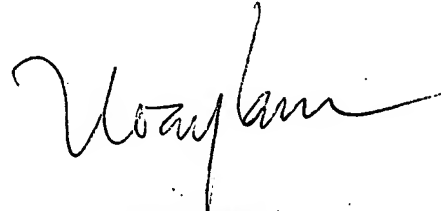
Any inquiry concerning this communication or earlier communications from the examiner should be directed to DiLinh Nguyen whose telephone number is (571) 272-1712. The examiner can normally be reached on 8:00AM - 5:00PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DLN



HOAI PHAM
PRIMARY EXAMINER